

FORM PTO-1390 (Modified)
(REV 11-98)

U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE

ATTORNEY'S DOCKET NUMBER

TRANSMITTAL LETTER TO THE UNITED STATES

DESIGNATED/ELECTED OFFICE (DO/EO/US)

CONCERNING A FILING UNDER 35 U.S.C. 371

09669/002001

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR

09/856191

INTERNATIONAL APPLICATION NO.

PCT/FR99/02690

INTERNATIONAL FILING DATE

November 4, 1999

PRIORITY DATE CLAIMED

November 17, 1998

TITLE OF INVENTION

FORGERY PREVENTING DEVICE IN AN INTEGRATED CIRCUIT CARD

APPLICANT(S) FOR DO/EO/US

Christian GUION

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. ☒ This is a **FIRST** submission of items concerning a filing under 35 U.S.C. 371.
2. ☐ This is a **SECOND** or **SUBSEQUENT** submission of items concerning a filing under 35 U.S.C. 371.
3. ☒ This is an express request to begin national examination procedures (35 U.S.C. 371(f)) at any time rather than delay examination until the expiration of the applicable time limit set in 35 U.S.C. 371(b) and PCT Articles 22 and 39(1).
4. ☐ A proper Demand for International Preliminary Examination was made by the 19th month from the earliest claimed priority date.
5. ☒ A copy of the International Application as filed (35 U.S.C. 371 (c) (2))
 - a. ☐ is transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☒ has been transmitted by the International Bureau.
 - c. ☐ is not required, as the application was filed in the United States Receiving Office (RO/US).
6. ☐ A translation of the International Application into English (35 U.S.C. 371(c)(2)).
7. ☒ A copy of the International Search Report (PCT/ISA/210).
8. ☐ Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371 (c)(3))
 - a. ☐ are transmitted herewith (required only if not transmitted by the International Bureau).
 - b. ☐ have been transmitted by the International Bureau.
 - c. ☐ have not been made; however, the time limit for making such amendments has NOT expired.
 - d. ☐ have not been made and will not be made.
9. ☐ A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
10. ☒ An oath or declaration of the inventor(s) (35 U.S.C. 371 (c)(4)).
11. ☐ A copy of the International Preliminary Examination Report (PCT/IPEA/409).
12. ☐ A translation of the annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371 (c)(5)).

Items 13 to 20 below concern document(s) or information included:

13. ☒ An Information Disclosure Statement under 37 CFR 1.97 and 1.98.
14. ☐ An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.
15. ☐ A **FIRST** preliminary amendment.
16. ☐ A **SECOND** or **SUBSEQUENT** preliminary amendment.
17. ☐ A substitute specification.
18. ☐ A change of power of attorney and/or address letter.
19. ☒ Certificate of Mailing by Express Mail
20. ☒ Other items or information:



22511

PATENT TRADEMARK OFFICE

French Search Report (2 pgs)

U.S. APPLICATION NO. (IF KNOWN, SEE 37 CFR <div style="font-size: 2em; font-weight: bold;">09/856191</div>		INTERNATIONAL APPLICATION NO. <div style="font-weight: bold;">PCT/FR99/02690</div>		ATTORNEY'S DOCKET NUMBER <div style="font-weight: bold;">09669/002001</div>	
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21. The following fees are submitted:				CALCULATIONS PTO USE ONLY	
BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)) : <input type="checkbox"/> Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$970.00 <input checked="" type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$840.00 <input type="checkbox"/> International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$690.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$670.00 <input type="checkbox"/> International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(1)-(4) \$96.00 <div style="text-align: right; font-weight: bold;">ENTER APPROPRIATE BASIC FEE AMOUNT =</div>				<div style="font-weight: bold; font-size: 1.2em;">\$840.00</div>	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (e)). <div style="text-align: right; font-weight: bold;">\$0.00</div>					
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE		
Total claims	12 - 20 =	0	x \$18.00	\$0.00	
Independent claims	1 - 3 =	0	x \$78.00	\$0.00	
Multiple Dependent Claims (check if applicable).			<input checked="" type="checkbox"/>	\$260.00	
TOTAL OF ABOVE CALCULATIONS =				\$1,100.00	
Reduction of 1/2 for filing by small entity, if applicable. Verified Small Entity Statement must also be filed (Note 37 CFR 1.9, 1.27, 1.28) (check if applicable).				<input type="checkbox"/>	\$0.00
SUBTOTAL =				\$1,100.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492 (f)).				\$0.00	
TOTAL NATIONAL FEE =				\$1,100.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31) (check if applicable).				<input type="checkbox"/>	\$0.00
TOTAL FEES ENCLOSED =				\$1,100.00	
				Amount to be: refunded	\$
				charged	\$

☒ A check in the amount of **\$1,100.00** to cover the above fees is enclosed.

☐ Please charge my Deposit Account No. _____ in the amount of _____ to cover the above fees.
 A duplicate copy of this sheet is enclosed.

☒ The Commissioner is hereby authorized to charge any fees which may be required, or credit any overpayment to Deposit Account No. **500-591** A duplicate copy of this sheet is enclosed.

NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137(a) or (b)) must be filed and granted to restore the application to pending status.

SEND ALL CORRESPONDENCE TO:

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SIGNATURE

Jonathan P. Osha

NAME

33,986

REGISTRATION NUMBER

5/17/01

DATE

FORGERY PREVENTING DEVICE IN AN INTEGRATED CIRCUIT CARD

Field

5 The present invention relates to an integrated circuit device having a memory area comprising a data memory.

Background

10 Such integrated circuit devices are widely used in applications where information processing security is essential. In particular, these are integrated circuit cards including applications relating to the fields of health, mobile telephony, or also banking applications.

15 An integrated circuit card is composed of a plastic card body which incorporates an electronic unit. This card communicates with a terminal, for example a mobile telephone, a banking terminal or also a computer, through a communications network and is able to send
20 messages containing encrypted information to said terminal through the network so as to make information transfers secure. In everyday language, the message is said to be signed. For computing encrypted information, the card employs a secret coding key which is located
25 within the data memory of its memory area and an encryption algorithm.

 Although information transfers are thus made secure, an integrated circuit card remains vulnerable since a forger could perform many actions on the card
30 which would allow him or her to uncover its secrets. Thus, said forger, wishing to find the coding key, could for example send a signature instruction message to the card and keep a record of the signals generated when executing said instruction. Thereafter, he or she could
35 send a large number of signature instructions for the same message, expose the card to electromagnetic perturbations at specific time points during the progress of said algorithm and keep records of the

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various emitted signals. By matching records of signals obtained during perturbations with the first record, forgers can analyze differences or the absence of differences between the various obtained encrypted pieces of information in order to uncover a cod key portion. Thus, in spite of the secure information transfer performed by the card, forgers can still access confidential information by performing a very large number of actions on the integrated circuit card.

Thus, a technical problem to be solved by the present invention is to provide an integrated circuit device having a memory area comprising a data memory, which device would allow the card to become more secure by restricting the number of forgery actions that can be performed on the card.

Summary

According to the present invention, a solution to the technical problem posed is such that the data memory contains at least one counter element, at least one indicator element and at least one threshold value, which counter element, on the one hand, counts at least one number of event occurrences within said device, and, on the other hand, is likely to reach said threshold value which is indicative of a large maximum number of occurrences of said events, said indicator element being designed to go from a first state to a second state when said counter element has reached said threshold value.

Thus, as explained in detail below, the device according to the invention enables to restrict the number of possible actions or events performed on said integrated circuit card, on the one hand, by means of a counter element which will count the number of actions performed taking into account an action or a group of actions, and, on the other hand, by means of an indicator element which will indicate that the threshold value of the event or action occurrence number has been

reached, so that afterwards, a sanction can be applied the next time said threshold value is exceeded.

Other features and advantages of the invention will become apparent in the following description of preferred embodiments of the present invention, provided by way of non-limiting examples, in reference to the appended figures.

Brief Description of the Drawings

Figure 1 is a schematic diagram of an integrated circuit device according to the invention, here an integrated circuit card.

Figure 2 is a schematic diagram showing a memory area in the card of Figure 1 according to the invention.

Figure 3 is a schematic diagram showing the distribution of counter and indicator elements within the memory area of Figure 2.

Figure 4 is a schematic diagram showing another the distribution of counter and indicator elements within the memory area of Figure 2.

Figure 5 is a schematic diagram of another embodiment of the invention, wherein the memory area of Figure 2 has two identical indicator elements.

Detailed Description of the Invention

Figure 1 shows an integrated device 10 which, in the disclosed embodiment, is an integrated circuit card.

Card 10 has a control unit 11 (such as a central processor unit or CPU), a memory area 12 having a data memory 14 and a contact block 13, for electrical connection, for instance to a card-reader connector.

Memory area 12 is shown in Figure 2. It has a counter element CPT, a threshold value VS, and an indicator element I as well as disabling means Mb, said indicator element being designed for going from a first state e1 to a second state e2 when the counter element has reached said threshold value. While the card is being used, several events can occur, an event being an

action which occurs within said device and leads to some result, for which a mean occurrence number can be determined while the device is being used. Thus, for example, a power-on is an event in response to which the card will send a message, often called "the reply-to-reset message". The sending of a signed message is also an event.

While a card is being used, for a particular application, the mean number of events that can occur, for example of the type "send signed message", can be determined. Thus, for banking applications, over a two-year period which is typical of a credit card's life span, there will be an average of three hundred signed messages for a card belonging to a user who employs the card about three times a week, and six hundred for a user who uses it about five times a week.

In Figure 2, a counter element CPT counts at least one number of event occurrences in the card, for example the signed message occurrence number. The counter element may reach the threshold value VS, which is indicative of a large maximum number of occurrences of said events. In the case when the integrated circuit card comprises a read only memory (ROM), an erasable and programmable read only memory (EPROM) and an electrically erasable programmable read only memory (EEPROM), the threshold value VS, since it is fixed, can reside within one of the three memories, wherein said memories, according to the present disclosure, are a data memory, whereas the counter and indicator elements will reside within a PROM, since their value can vary.

According to the invention, the threshold value represents an unlikely number of occurrences of such events which occur within said device when normally used. In order to detect fraudulent usage of the device, this maximum number of event occurrences is chosen to be large since it represents the number of unlikely event occurrences, and therefore, this large maximum number of event occurrences is greater than about one hundred, and

preferably, greater than about one thousand. With such values, different events in different applications can be taken into account. In the aforementioned example, it is known that it is unlikely that two thousand signed message occurrences will occur between the card and a banking terminal. Therefore, in this case, the threshold value will be set to two thousand. If such a case occurs, it is very likely caused by a forger attempting to uncover secrets stored within the card.

Therefore, to prevent forgery, when element CPT has reached threshold value VS, indicator element I goes from a first state e1 to a second state e2, which is also referred to as element I going from a passive state to an active state, and memory area 12 in the device according to the invention further includes means Mb for disabling the operation of said device when an indicator element has gone to the second state e2. Thus, if two thousand occurrences of signed messages have been reached, an element I is enabled and the disabling means Mb, after having checked the state of said element I, disables the card, which can no longer either receive or generate any event of the same nature as the one that has enabled the indicator element, which event, in the present case, is a signed message type of event, or receive any event or take any action whatsoever. In the latter case, the card can no longer be used and is conventionally said to be silent.

According to a first embodiment of the device according to the invention, a counter element is defined for a unique event.

Therefore, in Figure 3, counter element CPT1 is defined for event E1, element CPT2, for event E2 and element CPT3, for event E3.

However, although events can be of different nature, their occurrence numbers during the life span of a card can be of the same order of magnitude and therefore their unlikely occurrence numbers can be the same. As a consequence, it may be desired to classify

them into the same category. For example, it may be assumed that sending signed messages belongs to the same category as sending encrypted messages. Thus, according to a second embodiment of the device according to the invention, a counter element is defined for at least two events, which events belong to the same category. Thus, according to the schematic diagram shown in Fig. 4, counter elements CPT1 and CPT2 are defined for two event categories (E1, E2, E3) and (E4, E5), respectively.

In both embodiments according to the invention, a threshold value is defined for each counter element. Thus, Values VS1, VS2 and VS3 being associated with each respective event, such as in the case of Figure 3, is equivalent to values VS1 and VS2 being associated with each respective category of events, such as in Figure 4. When an element CPT has reached its threshold value VS, indicator elements indicate that the maximum allowed number of event occurrences represented by threshold value VS has been reached.

In both aforementioned embodiments, said indicator elements can be implemented in two different ways.

According to a first variation shown in Figure 3, in the device according to the invention, at least one indicator element I is defined for a unique counter element CPT. Thus, when counter element CPT1 reaches threshold value VS1, indicator element I1 goes to the second state e12. The disabling means Mb checks the state of element I1 and as soon as the latter has gone to the second state, it disables the card, which is also the case for elements I2 and I3.

According to a second variation of the embodiment shown in Figure 4, in the device according to the invention, at least one indicator element I is defined for at least two counter elements CPT. Thus, when one of elements CPT1 and CPT2 reaches its respective threshold value VS1 or VS2, element I1 goes from state e11 to state e12, which indicates that a forgery has taken place and as a consequence, means Mb disables the card.

Thus, according to both embodiments and to both associated variations, the number of event occurrences within the card and therefore the number of possible actions that can be performed on the card by a forger, are restricted.

However, a forger could modify the state of an indicator element by making it passive if it was previously active, before means Mb can disable the card and therefore could freely continue penetrating card secrets.

Thus, the data memory 14 in the device according to the invention has at least two identical indicator elements residing at non-contiguous locations within the data memory, said elements being attached to the same set of counter elements comprising one or more counters according to the variations mentioned above in reference to Figures 3 and 4. As shown in Figure 5, indicator element I'1 is the same as I1 since they are both attached to elements CPT1 and CPT2 and both go from a first state to a second state at the same time when either one of these two counter elements has reached its maximum value. Moreover, the indicator elements reside within data memory 14 in the card at non-contiguous locations, so as to prevent forgery such as modifying the state of all active identical indicator elements, which forgery would be made easier by the elements residing at closely spaced locations. Thus, even if a forger manages to modify the state of one element I by making it passive, other identical indicator elements will remain active because, in such a case, it will be unlikely for said forger to find the location of all identical indicator elements.

On the other hand, in the device according to the invention, disabling means Mb disables the operation of said device when the state of one indicator element is different from that of another identical indicator element. The forger's action can thus be countered.

It should be appreciated that in any case, the values of the first states of indicator elements can be equivalent to, or different from each other. The is also true for the second state values.

5 Thus, with both embodiments and both variations of the indicator elements, and due to the system using identical indicator elements, the device according to the invention allows the card to be made more secure by restricting the number of possible actions that can be
10 performed on it by a forger.

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8. A device according to any one of claims 1 to 6, characterized in that at least one indicator element is defined for at least two counter elements.

5 9. A device according to any one of the preceding claims, characterized in that said data memory contains at least two indicator elements at non-contiguous locations within said data memory.

10 10. A device according to any one of the preceding claims, characterized in that said memory area comprises means for disabling the operation of said device when an indicator element has gone to the second state.

15 11. A device according to claims 9 and 10, characterized in said disabling means disable the operation of said device when the state of one indicator element is different from the state of another identical indicator element.

20 12. A device according to any one of the preceding claims, characterized in that said large maximum number of event occurrences is greater than about one hundred, and preferably, greater than about one thousand.

2025 RELEASE UNDER E.O. 14176

The present invention relates to an integrated circuit device having a memory area comprising a data memory. The invention is characterized in that said data memory has at least one counter element, at least one indicator element and at least one threshold value, which counter element, on the one hand, counts at least one number of occurrences of events within said device, and on the other hand, can reach said threshold value which is indicative of a large maximum number of occurrences of said events, said indicator element being designed to go from a first state to a second state when said counter element has reached said threshold value. In particular, the invention can be applied to smart cards.

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1/3

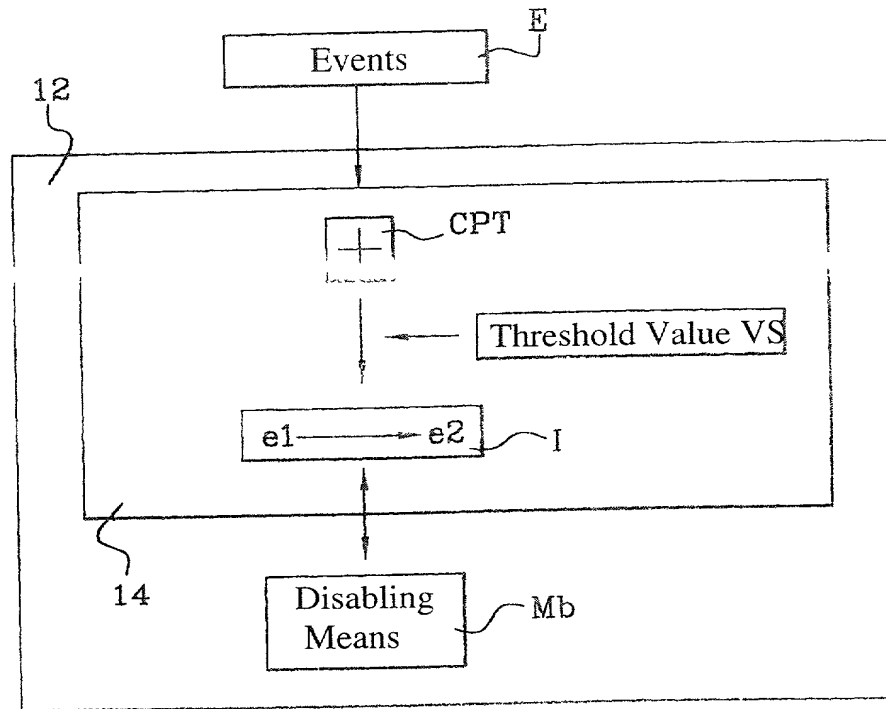
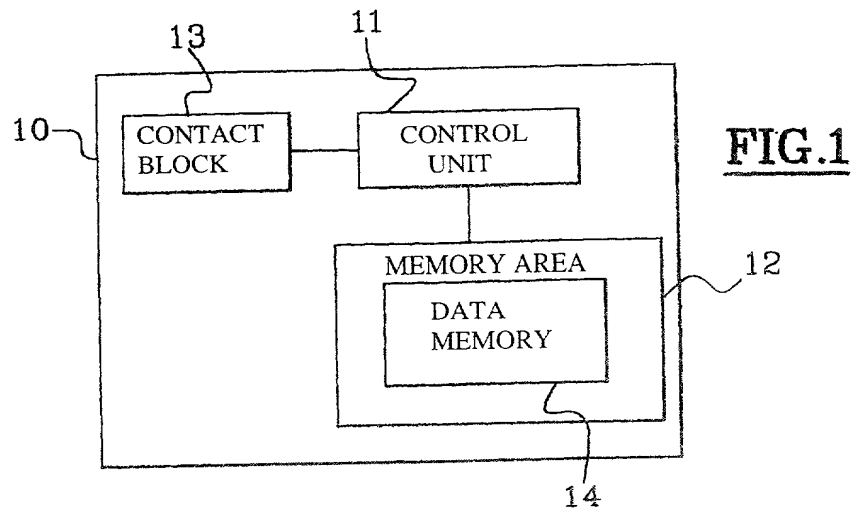
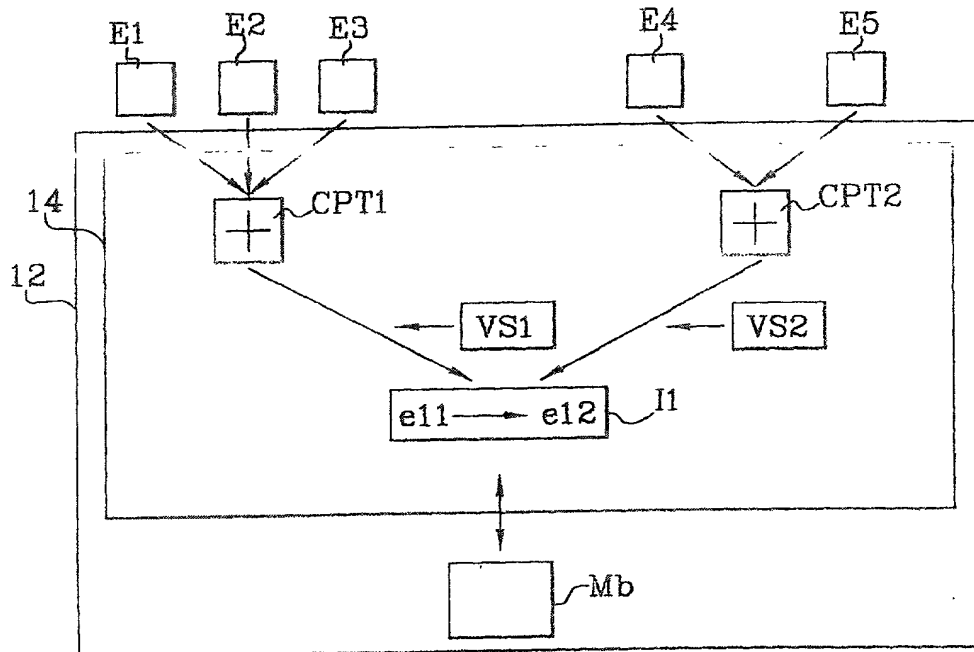
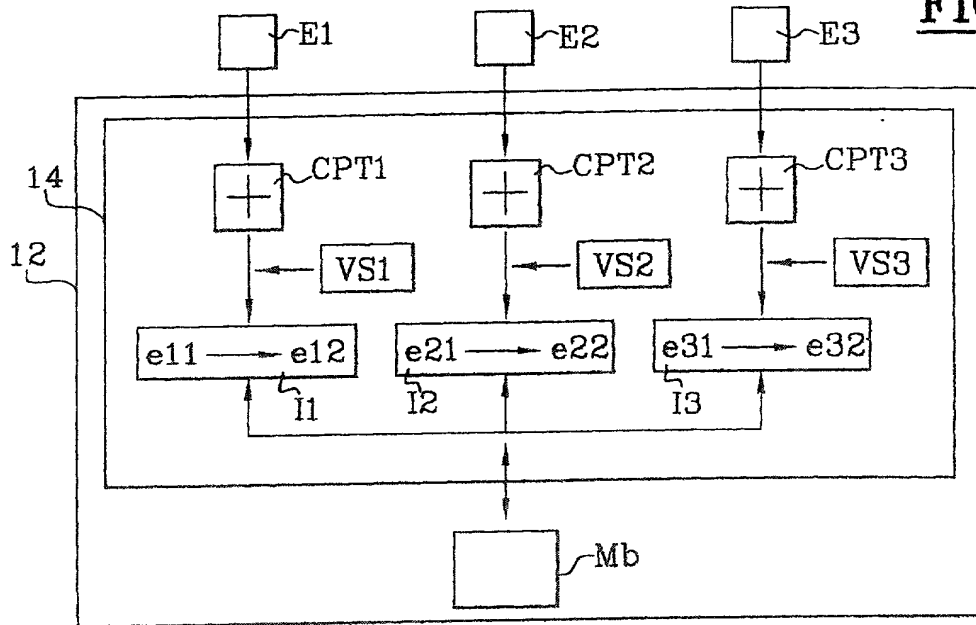
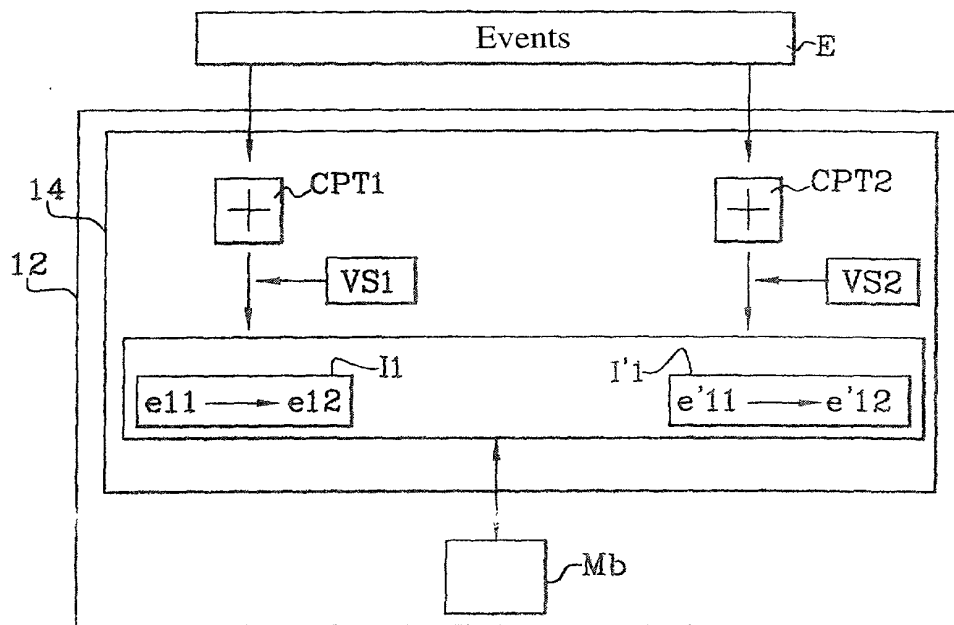


FIG.2

FIG.3**FIG.4**

FIG.5

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (37 CFR 1.63)	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 35%;">Attorney Docket Number</td> <td>09669/002001</td> </tr> <tr> <td>First Named Inventor</td> <td>Christian A. GUION</td> </tr> <tr> <td colspan="2" style="text-align: center;">COMPLETE IF KNOWN</td> </tr> <tr> <td>Application Number</td> <td>09 / 856, 191</td> </tr> <tr> <td>Filing Date</td> <td>May 17, 2001</td> </tr> <tr> <td>Group Art Unit</td> <td></td> </tr> <tr> <td>Examiner Name</td> <td></td> </tr> </table>		Attorney Docket Number	09669/002001	First Named Inventor	Christian A. GUION	COMPLETE IF KNOWN		Application Number	09 / 856, 191	Filing Date	May 17, 2001	Group Art Unit		Examiner Name	
	Attorney Docket Number	09669/002001														
	First Named Inventor	Christian A. GUION														
	COMPLETE IF KNOWN															
	Application Number	09 / 856, 191														
Filing Date	May 17, 2001															
Group Art Unit																
Examiner Name																

As a below named inventor, I hereby declare that:

My residence, mailing address, and citizenship are as stated below next to my name.

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:


FORGERY PREVENTING DEVICE IN AN INTEGRATED CIRCUIT CARD.

(Title of the Invention)

the specification of which

☐ is attached hereto

OR

 was filed on (MM/DD/YYYY)

05/ 17/ 2001

as United States Application Number or PCT International

Application Number	09/ 856, 191	and was amended on (MM/DD/YYYY)	(if applicable).
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I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment specifically referred to above.

I acknowledge the duty to disclose information which is material to patentability as defined in 37 CFR 1.56, including for continuation-in-part applications, material information which became available between the *filing date of the prior application* and the national or PCT international filing date of the continuation-in-part application.

I hereby claim foreign priority benefits under 35 U.S.C. 119(a)-(d) or (f), or 365(b) of any foreign application(s) for patent, inventor's or plant breeder's rights certificate(s), or 365(a) of any PCT international application which designated at least one country other than the United States of America, listed below and have also identified below, by checking the box, any foreign application for patent, inventor's or plant breeder's rights certificate(s), or any PCT international application having a filing date before that of the application on which priority is claimed.

Application on which priority is claimed:					
Prior Foreign Application Number(s)	Country	Foreign Filing Date (MM/DD/YYYY)	Priority Not Claimed	Certified Copy Attached?	
				YES	NO
98/ 14409	France	11/ 17/ 1998	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
			<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

☐ Additional foreign application numbers are listed on a supplemental priority data sheet PTO/SB/02B attached hereto:

[Page 1 of 2]

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NAME OF SOLE OR FIRST INVENTOR: ☐ A petition has been filed for this unsigned inventorGiven Name
(first and middle [if any])

Christian A.

Family Name
or Surname

GUION

Inventor's
Signature

Date 26/JUL/01

Residence: City

Verrières

State

Country France

Citizenship

French

Mailing Address

50, Avenue Jean Jaurès – B.P. 620-12

City

Montrouge Cedex

State

ZIP

92542

Country

France

NAME OF SECOND INVENTOR: ☐ A petition has been filed for this unsigned inventorGiven Name
(first and middle [if any])Family Name
or SurnameInventor's
Signature

Date

Residence: City

State

Country

Citizenship

Mailing Address

City


State

ZIP

Country

☐ Additional inventors are being named on the ____ supplemental Additional Inventor(s) sheet(s) PTO/SB/02A attached hereto.

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Please type a plus sign (+) inside this box 

PTO/SB/81 (02-01)

Approved for use through 10/31/2002. OMB 0651-0035

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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POWER OF ATTORNEY OR AUTHORIZATION OF AGENT

Application Number	09/ 856, 191
Filing Date	May 17, 2001
First Named Inventor	Christian A. GUION
Title	Forgery Preventing Device..
Group Art Unit	
Examiner Name	
Attorney Docket Number	09669/002001

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I am the:

☒ Applicant/Inventor.

☐ Assignee of record of the entire interest. See 37 CFR 3.71.

Statement under 37 CFR 3.73(b) is enclosed. (Form PTO/SB/96).

SIGNATURE of Applicant or Assignee of Record

Name

Christian A. GUION

Signature

Date

16 JUL 01

NOTE: Signatures of all the inventors or assignees of record of the entire interest or their representative(s) are required. Submit multiple forms if more than one signature is required, see below*.

☐ *Total of _____ forms are submitted.

Burden Hour Statement: This form is estimated to take 3 minutes to complete. Time will vary depending upon the needs of the individual case. Any comments on the amount of time you are required to complete this form should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, Washington, DC 20231. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Assistant Commissioner for Patents, Washington, DC 20231.